

OCT 15 1990



572

October 13, 1990

Mr. Chuck Schwer
State of Vermont
Department of Environmental Conservation
Petroleum Sites Management Section
103 South Main St.
Waterbury, VT 05676

Dear Chuck:

Enclosed is the report on the investigation of subsurface petroleum contamination at Franklin Cheese, in Enosburg Falls, Vermont. Please call me with any questions which you may have regarding the investigation.

Sincerely,

A handwritten signature in dark ink, appearing to read "Peter M. Murray", is written over the typed name.

Peter M. Murray
Project Hydrogeologist

OCT 15 1990

REPORT ON THE INVESTIGATION
OF SUBSURFACE PETROLEUM CONTAMINATION
FRANKLIN COUNTY CHEESE CORP./HAHN'S
ENOSBURG FALLS, VERMONT

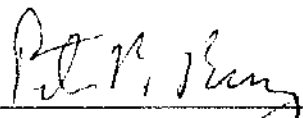
September, 1990

Prepared for:

Franklin County Cheese Corp./Hahn's
Enosburg Falls, Vermont

Prepared by:

Griffin International, Inc.
Williston, Vermont



Peter M. Murray
Project Hydrogeologist

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1.0 INTRODUCTION

This report details the investigation of subsurface petroleum contamination at Franklin County Cheese Corp./Hahn's (Franklin Cheese), in the Village of Enosburg Falls, Vermont. The contamination is the result of leaks in two underground #6 oil storage tanks which were recently removed from Franklin Cheese property. The investigation has been conducted by Griffin International, Inc., for Franklin Cheese, under the supervision of the State of Vermont Department of Environmental Conservation (D.E.C.).

2.0 SITE BACKGROUND

2.1 Site History

On September 6th, 1990, Franklin Cheese excavated two underground storage tanks from a location immediately south of the plant building. These tanks had been used to store #6 oil for the plant's boilers and have not been in active use for at least twenty years. A D.E.C. inspector, who was on site during the excavation, detected visible, black petroleum contamination of the soils. Several holes were also detected in both tanks. It is assumed that the soil contamination resulted in the release of #6 oil through these holes while the tanks were in use.

In response, the D.E.C. required that contaminated soils, excavated from the tank pit, be stockpiled on plastic at the eastern end of the plant building. Approximately 200 yards of contaminated soils were stockpiled and mixed with cow manure to enhance biodegradation of the contamination. The D.E.C. also required that Franklin Cheese contract a consultant to investigate the extent of the contamination beyond the limits of the excavation. Franklin Cheese contracted Griffin International to perform the investigation on September 8th.

2.2 Site Description

Franklin Cheese is located on the east side of the small village of Enosburg Falls (see Site Location map in Appendix A). The village consists of a variety of land uses including residential, commercial, industrial and agricultural. All homes and businesses in the village are served by the village water system which is supplied by a

reservoir in the adjacent Town of Berkshire. The plant used to draw its process water from a drilled well inside the building and is now served by the village water system. Franklin Cheese is located approximately 1,800 feet north of the Mississquoi River on a broad alluvial plain. A railroad right of way and a cemetery are located between the plant and the river.

The plant has been in continuous operation since the last century. The subsurface in the vicinity of the plant consists of silty clay, deposited in post-glacial Lake Vermont, and more recent alluvial deposits. The plant appears to be situated on the contact between these two deposits.

3.0 INVESTIGATIVE PROCEDURES

3.1 Monitoring Well Installation

On September 8th, Griffin personnel visited the site to supervise the installation of four groundwater monitoring wells, MW-1, MW-2, MW-3 and MW-4, in the vicinity of the tank excavation (see Site Map, in Appendix A). These wells were installed by excavation with a track mounted hoe. The holes were excavated to depths of approximately eleven feet. Each well was constructed of five feet of perforated, two inch diameter, PVC pipe, wrapped in filter cloth, and PVC well casing. The wells were placed in the holes which were then backfilled with the excavated material. Well construction details are listed in the well logs in Appendix B.

The excavated soils were examined by the Griffin hydrogeologist for apparent petroleum contamination in the forms of odors or sheens. The soils excavated for MW-1 consisted of 6.5' of fill material, overlying fine to coarse sand and silt. No apparent contamination was detected in these soils. Soils collected from the hole for MW-2 consisted of 6' of red coal slag, bricks and other debris, overlying sand, silt and gravel. No apparent contamination was detected in these soils. Soils collected from MW-3 also consisted of coal and brick fill overlying sand silt and gravel. No petroleum odors were detected in the soils but a noticeable sheen was observed on the groundwater which accumulated in the hole. Soils retrieved from MW-4 also consisted of fill overlying sand silt and gravel. As in MW-3, no odors were detected but a sheen was observed on the groundwater.

MW-5 had been installed on September 6th by the contractors performing the excavation. MW-6 and MW-7 were installed before the excavation was backfilled during the week of September 10th. These wells were constructed similar to the other four wells.

In addition to the installation of the monitoring wells, the Griffin Hydrogeologist also inspected the tank excavation for soil characteristics and contamination. The soils in the tank pit walls consisted of fine silty sand with a trace of clay to a depth of approximately 6.5'. These soils contained no petroleum odors. Soils from a depth of 6.5' to 8' consisted of coarse sand and gravel and contained high concentrations of black petroleum contamination. Some contaminated groundwater was seeping from this layer, into the tank pit, but was not accumulating at the bottom of the pit. From a depth of 8' to 11' the soils consisted of fine, silty sand and clay. Little apparent petroleum contamination was detected in this layer. Below a depth of 11', the extent of the excavation, the soils consisted of wet, gray clay containing no apparent contamination. The clay is apparently acting as a confining layer for the contamination.

3.2 Groundwater Gradient and Flow Direction Determination

On September 10th, Griffin measured water table elevations in each monitoring well (MW-6 and MW-7 contained no groundwater). Liquid level measurements are listed in Appendix C. These elevations were then used to prepare the Groundwater Contour Map, in Appendix A.

The map indicates that groundwater in the vicinity of Franklin Cheese generally flows south, toward the Mississquoi River. The groundwater contours show a depression in the water table in the vicinity of MW-5, indicating a possible area of relatively high transmissivity extending from MW-5, to the southeast. This depression may be due to the removal of soil moisture in the area due to excavation of soil from the tank pit. In silty/clayey soils, groundwater recharge rates are relatively low. This may have resulted in a temporary water table depression near the pit. No groundwater has accumulated in MW-6 and MW-7 since the installation of the two wells. This may also be due to slow recharge rates.

The groundwater gradient across the site is a relatively slight 1.5%. Combined with the low permeability of the soils, it is assumed that the 1.5% gradient results in slow rates of groundwater migration.

3.3 Groundwater and Soil Sampling and Analysis

Griffin also collected water samples from four monitoring wells and the old supply well on September 10th for analysis using EPA Method 418.1 for total hydrocarbons. The results of the laboratory analyses are listed in Appendix D. The analytical results indicate that the groundwater in these wells contained no hydrocarbons on the sampling date. This data conflicts with the presence of sheens on the water samples from MW-3 and MW-4. According to Endyne Labs, the sheens could have been caused by volatile aromatic compounds, which could have been lost in the infra-red spectrometry extraction process and would not be detected by the analysis.

In addition to the water samples, Griffin also collected a soil sample from the stockpiled contaminated soil for analysis for volatile contamination using EPA Method 8240. The analysis indicated that the soil contained benzene, ethyl benzene, toluene and xylenes. It is likely that these compounds are causing the sheens on the groundwater in the two downgradient wells.

4.0 CONCLUSIONS

Based on the findings of the above investigation, Griffin International has reached the following conclusions regarding subsurface petroleum contamination at Franklin Cheese.

1. There was a release of #6 oil to the subsurface as a result of leaks in the two, 10,000 gallon underground storage tanks which were excavated and removed from the site on September 8th, 1990. The amount and duration of the release are undetermined.
2. The contamination is in both the adsorbed and dissolved phases. Adsorbed contamination contains benzene, toluene, ethyl-benzene and xylenes. No dissolved contamination was detected in the water samples using Method 418.1, however, it is assumed that the groundwater does contain BTEX due to the detection of these compound in the soil samples. No free floating product has been detected during the investigation.
3. The contamination is largely contained within a sand and gravel layer, one and one half feet thick, which extends across the site at a depth of approximately six feet. A clay layer at

eleven feet is likely acting as a confining layer for vertical migration of the contamination.

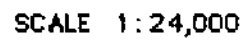
4. The water table beneath the site dips to the south at a 1.5% gradient. Overall groundwater migration rates across the site are presumed to be low.
5. The most likely receptors of the contamination are the cemetery and the Mississquoi River. Due to the natural processes of dilution, it is assumed that, by the time the contamination reaches the river, it is in nondetectable concentrations. The contamination will not likely affect the local drinking water supply which is a reservoir located several miles from the site.

APPENDIX A:

Site Maps

PROJECT: FRANKLIN CHEESE
LOCATION: ENOSBURG FALLS, VERMONT

LOCATION: ENOSBURG FALLS, VERMONT



SITE MAP

PROJECT: FRANKLIN CHEESE/HAHN'S
LOCATION: ENOSBURG FALLS, VT

● MONITORING WELL



● MW-1

SUPPLY
WELL
○



● MW-5

● MW-2

TANK

● MW-6

EXCAVATION

● MW-7

● MW-3

FRANKLIN

CHEESE

LOADING DOCK

● MW-4

Griffin International

GROUNDWATER CONTOUR MAP

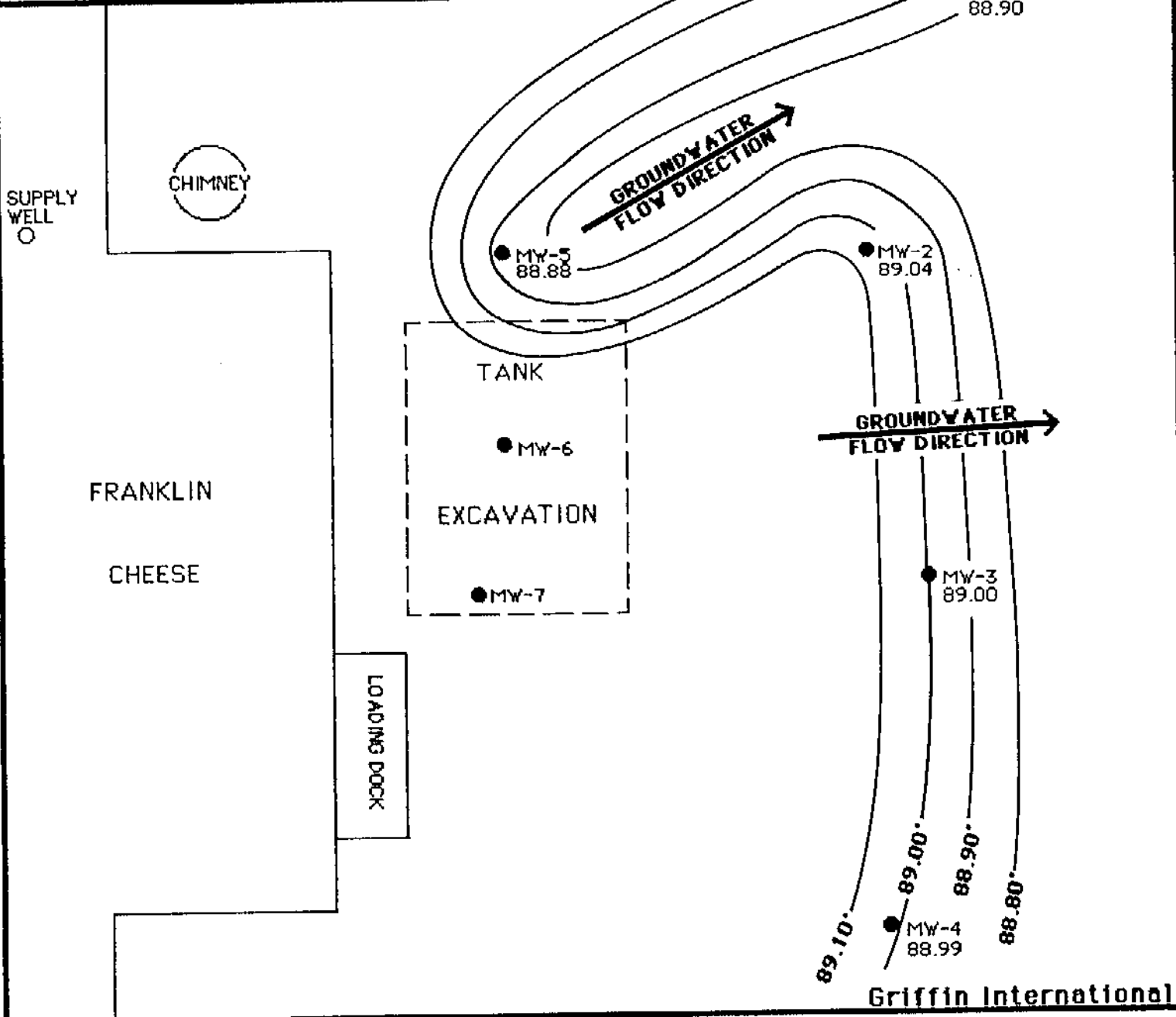
PROJECT: FRANKLIN CHEESE/HAHN'S
LOCATION: ENOSBURG FALLS, VT
MONITORING DATE: 9/10/90

● MONITORING WELL

WELL IDENTIFICATION:

MW-1 - WELL I.D.

88.90 - WATER TABLE ELEVATION IN FEET



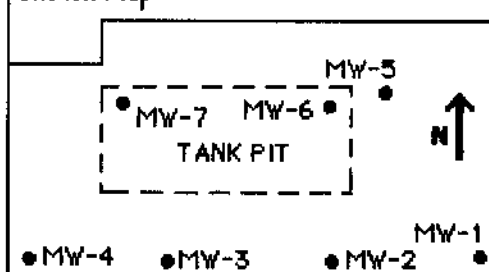
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APPENDIX B:

Well Logs

PROJECT FRANKLIN CHEESE/HAHN'SLOCATION ENOSBURG, VERMONTDATE DRILLED 9/8/90 TOTAL DEPTH OF HOLE 11'DIAMETER SCREEN DIA. 2" LENGTH 5' SLOT SIZE PERF PIPECASING DIA. 2" LENGTH 7' TYPE PVCDRILLING CO. DRILLING METHOD BACKHOEDRILLER LOG BY P MURRAYWELL NUMBER MW-1

Sketch Map

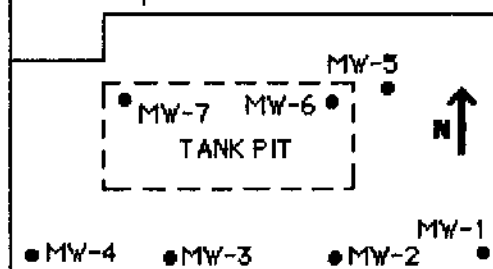


DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		CASING STICKUP		
1				Brick and coal ash fill
2		WELL CASING		
3				
4				
5		NATIVE BACKFILL		
6				
7		WELL SCREEN		Fine SAND, some silt, trace clay
8				WATER TABLE ▼
9				NO PETROLEUM ODOR
10		BOTTOM PLUG		Wet gray CLAY
11				BASE OF EXPLORATION AT 11'
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				

Griffin International

PROJECT FRANKLIN CHEESE/HAHN'SLOCATION ENOSBURG, VERMONTDATE DRILLED 9/8/90 TOTAL DEPTH OF HOLE 11'DIAMETER SCREEN DIA. 2" LENGTH 5' SLOT SIZE PERF PIPECASING DIA. 2" LENGTH 7' TYPE PVCDRILLING CO. DRILLING METHOD BACKHOEDRILLER LOG BY P MURRAYWELL NUMBER MW-2

Sketch Map

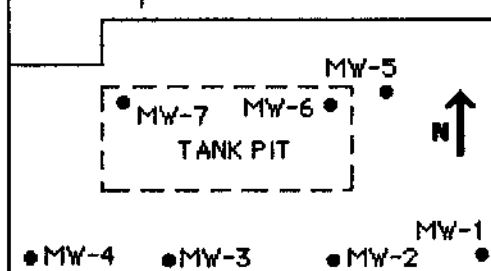


DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		CASING STICKUP		
1				
2		WELL CASING		Fill: Coal ash
3				
4				
5		NATIVE BACKFILL		
6				
7		WELL SCREEN		NO PETROLEUM ODOR Fine SAND, some clay and silt
8				WATER TABLE ▼
9				
10		BOTTOM PLUG		Wet, coarse SAND, some silt, little gravel
11				Wet, gray CLAY, little fine sand
12				BASE OF EXPLORATION AT 11'
13				
14				
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22				
23				
24				
25				
26				

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PROJECT FRANKLIN CHEESE/HAHN'SLOCATION ENOSBURG, VERMONTDATE DRILLED 9/8/90 TOTAL DEPTH OF HOLE 11'DIAMETER SCREEN DIA. 2" LENGTH 5' SLOT SIZE PERF PIPECASING DIA. 2" LENGTH 7' TYPE PVCDRILLING CO. DRILLING METHOD BACKHOEDRILLER LOG BY P MURRAYWELL NUMBER MW-3

Sketch Map

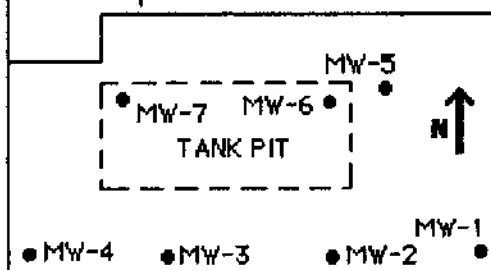


DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		CASING STICKUP		
1				Fill: Bricks, coal ash, gravel, sand
2		WELL CASING		
3				
4				
5		NATIVE BACKFILL		
6				NO PETROLEUM ODOR PETROLEUM SHEEN ON GROUNDWATER
7		WELL SCREEN		
8				WATER TABLE ▼
9				Wet, fine SAND, some silt and clay
10				Wet, coarse SAND, some silt, little gravel
11		BOTTOM PLUG		Wet, gray CLAY, some fine sand
12				BASE OF EXPLORATION AT 11'
13				
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25				
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PROJECT FRANKLIN CHEESE/HAHN'SLOCATION ENOSBURG, VERMONTDATE DRILLED 9/8/90 TOTAL DEPTH OF HOLE 11'DIAMETER SCREEN DIA. 2" LENGTH 5' SLOT SIZE PERF PIPECASING DIA. 2" LENGTH 7' TYPE PVCDRILLING CO. DRILLING METHOD BACKHOEDRILLER LOG BY P MURRAYWELL NUMBER MW-4

Sketch Map



DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON	DESCRIPTION / SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)
0		CASING STICKUP		
1				Fill: Bricks, coal ash, gravel, sand
2		WELL CASING		
3				
4				
5		NATIVE BACKFILL		
6				Fine, silty SAND, trace clay
7		WELL SCREEN		WATER TABLE ▼
8				NO PETROLEUM ODOR
9				Wet, coarse SAND, some gravel and silt
10		BOTTOM PLUG		Gray CLAY, some silt
11				BASE OF EXPLORATION AT 11'
12				
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APPENDIX C:
Liquid Level Data

APPENDIX D:
Laboratory Results



ENDYNE, INC.

RECEIVED 10/1/90

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

TOTAL HYDROCARBONS - EPA METHOD 418.1

CLIENT: Griffin International
REPORT DATE: September 21, 1990
PROJECT NAME: Franklin Cheese - Enosburg
DATE SAMPLED: September 10, 1990
DATE RECEIVED: September 10, 1990
DATE ANALYZED: September 17, 1990
SAMPLER: Don Tourangeau

<u>Reference number:</u>	<u>Concentration (mg/L)¹</u>
14,408	<0.8
14,409	<0.8
14,410	<0.8
14,411	<0.8
14,412	<0.8
14,413	<0.8

Sample ID:

14,408: MW #1; 10:30
14,409: MW #2; 10:50
14,410: MW #3; 11:10
14,411: MW #4; 11:25
14,412: Site Blank; 12:00
14,413: Supply Well; 11:40

Notes:

1 Method detection limit is 0.8 ppm

Reviewed by

Suzanne M. French

RECEIVED SEP 21 1990



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT
EPA METHOD 8240 -- SOIL EXTRACTION VOLATILES

CLIENT: Griffin International
PROJECT NAME: Franklin Cheese-Enosburg
REPORT DATE: September 19, 1990 ANALYSIS DATE: September 17, 1990
SAMPLER: Don Tourageau STATION: Soil-Pit
DATE SAMPLED: September 10, 1990 REF. #: 14414
DATE RECEIVED: September 10, 1990 TIME SAMPLED: 10:00 a.m.

<u>Parameter</u>	<u>Quantitation</u> <u>Limit (ug/kg)</u>	<u>Concentration</u> <u>(ug/kg)</u>
Acetone	100	ND ¹
Benzene	5	835.
Bromodichloromethane	5	ND
Bromoform	5	ND
Bromomethane	10	ND
2-Butanone	100	ND
Carbon Disulfide	5	ND
Carbon Tetrachloride	5	ND
Chlorobenzene	5	ND
Chloroethane	10	ND
2-Chloroethylvinyl ether	10	ND
Chloroform	5	ND
Chloromethane	10	ND
Dibromochloromethane	5	ND
1,1-Dichloroethane	5	ND
1,2-Dichloroethane	5	ND
1,1-Dichloroethene	5	ND
trans-1,2-Dichloroethene	5	ND
1,2-Dichloropropane	5	ND
cis-1,3-Dichloropropene	5	ND
trans-1,3-Dichloropropene	5	ND



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

Ref. #: 14414

<u>Parameter</u>	<u>Quantitation</u> <u>Limit (ug/kg)</u>	<u>Concentration</u> <u>(ug/kg)</u>
Ethyl Benzene	5	7040.
2-Hexanone	50	ND
4-Methyl-2-Pentanone	50	ND
Methylene Chloride	5	PLE ²
Styrene	5	ND
1,1,2,2-Tetrachloroethane	5	ND
Tetrachloroethene	5	ND
Toluene	5	505.
1,1,1-Trichloroethane	5	ND
1,1,2-Trichloroethane	5	ND
Trichloroethene	5	ND
Vinyl Acetate	50	ND
Vinyl Chloride	10	ND
Total Xylenes	5	43,500.

NUMBER OF UNIDENTIFIED PEAKS FOUND: 12

NOTES:

- 1 None detected
- 2 Present in background laboratory environment

Reviewed by Suzanne Girard